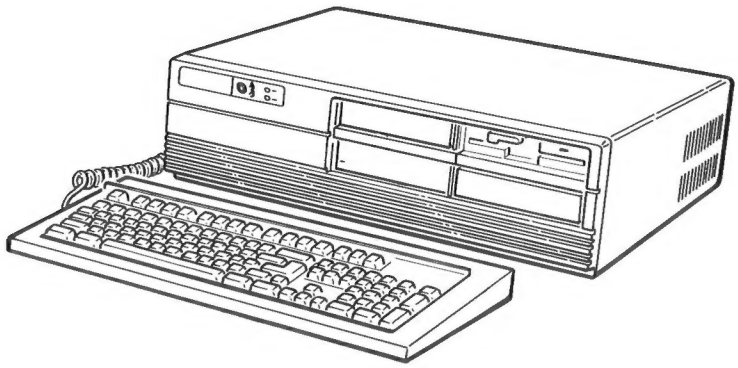
80386-BASED DESKTOP COMPUTER

Model H-386

ASSEMBLY 595-3973-01



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BENTON HARBOR, MICHIGAN 49022

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INTRODUCTION

The Heathkit 80386-Based Desktop Computer, Model H-386, is a true 32-bit advanced technology computer with a 16 MHz CPU clock frequency. It can run a large selection of readily available PC- and AT-compatible software.

A switching-type, regulated power supply provides plenty of reserve power for accomodating up to the maximum of 16M (megabytes) of additional systems memory, an additional (optional) floppy disk drive, and two (optional) Winchester drives.

Main processing and supervisory control functions are isolated on the 32-bit CPU board, which is built around the 16 MHz, 80386 microprocessor. For increased arithmetic processing, one of two available numeric coprocessors may be installed.

The system memory board contains 1M of RAM. A key design advantage of the system is the inclusion of fast "Enhanced Page-Mode" RAMs. This RAM technology is combined with the Computer's advanced paging controller, and AT-superset 32-bit memory bus, to eliminate wait states in many memory reads. To eliminate nearly all of the remaining wait states in memory access, an optional high-speed 64K RAM cache memory board (Model Z-525) is available.

System memory can be expanded in 1M or 4M increments to a maximum of 16M with the memory expansion options available. This memory expansion feature is combined with a hardware implementation of the Lotus-Intel-Microsoft Expanded Memory Specification (EMS), which is a method of using applications that are larger than the 640K memory limit of MS-DOS. For software that is written to take advantage of EMS, this system makes available up to 8M of memory, which is transparent to the user.

The I/O (Input/Output) board contains a Centronics-type parallel port and a 9-pin, RS-232C-type serial port for a variety of printers or other peripherals.

The disk controller board supports two floppy disk drives and two Winchester drives. A half-height 5-1/4" floppy disk drive, which provides for up to 1.2M of data storage, comes standard with the Computer.

ROM-based diagnostics are performed each time you apply power so you will always know the status of your Computer. A more comprehensive disk-based diagnostics package is also provided so you can easily confirm the viability of any part of your Computer throughout its life.

A 31 kHz EGA video board, Model Z-449, which is compatible with a variety of monitors listed among the following available accessories, is supplied with the H-386 Computer. Accessories that you can add to the basic, single-floppy-disk-drive Computer include:

- A second floppy disk drive as follows: a 5-1/4", 1.2M (Model ZD-12); or a 5-1/4", 360K (Model Z-207-7); or a 3-1/2", 1.4M (Model ZD-14) installed in a 5-1/4" bracket.*
- One or two 20M (65 ms), 3-1/2" Winchester drives (Model HWD-20-AT) installed in 5-1/4" bracket(s); or 40M (40 ms), 5-1/4" Winchester drives (Model ZD-400); or 80M (40 ms), 5-1/4" Winchester drives (Model ZD-800) in any combination.
- RAM in 1M or 4M increments with the Model Z-505 and Model Z-515 Memory Expansion Boards, respectively.
- 64K of RAM with a High-Speed Cache Memory Board, Model Z-525.
- A 31 kHz Monochrome Monitor, Model ZMM-149-A (amber screen) or 149-P (page white screen).
- A 31 kHz Monitor, Model ZCM-1390.

* You must purchase the Model HCA-15 Accessory Bracket if you plan to use the ZD-14 drive in your H-386 Computer.

- A 31 kHz Flat Technology Monitor, Model ZCM-1490.
- An EGA/CGA Color Monitor, Model ZVM-1380-C.
- An EGA/CGA Monochrome Monitor, Model ZMM-1470-G.
- A CGA Color Monitor, Model ZVM-1330.
- A TTL Monochrome Monitor, Model ZVM-1240.
- An 80287 Numeric Coprocessor, Model Z-416-2.
- An 80387 Numeric Coprocessor, Model Z-516.
- An Interconnect Cable (Model Z-417-1) for use between the controller card and one or two Winchester drives.*

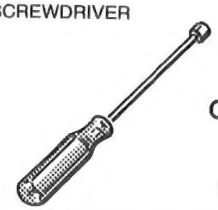
* The Interconnect Cable is not needed if you only have one HWD-20-AT drive. However, if you have two HWD-20-AT drives, you must purchase a Model Z-417-1 Interconnect Cable and a #134-1656 cable.

ASSEMBLY NOTES

The only tool you will need to assemble your Computer is a #1 (small) Phillips screwdriver and a 1/4" nut driver or wrench. Some configurations may also require a small flat-blade screwdriver.

#1 PHILLIPS SCREWDRIVER

1/4" – BLADE SCREWDRIVER



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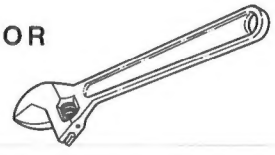


1/4" NUT DRIVER

1. Follow the instructions carefully. Read the entire step before you perform each operation.
2. Refer to the separate "Illustration Booklet" for the Pictorials and Details, and keep it with the Assembly Manual. The illustrations in it are arranged in the proper sequence, as called for in the assembly steps.
3. Pictorials show the overall operation for a group of assembly steps; details generally illustrate a single step. When you are directed to refer to a certain Pictorial "for the following steps," continue using that Pictorial until you are referred to another Pictorial for the next group of steps.
4. Position all parts as shown in the Pictorials.
5. Use a piece of heavy cardboard or indoor-outdoor carpet to protect your work surface and Computer from dents or scratches.

PARTS LIST

Check each part against the following list and the "Parts Pictorial" (Illustration Booklet, Page 1). The key numbers correspond to the numbers on the "Parts Pictorial." Return any part that is in an individual envelope, with the part number on it, back into its envelope until that part is called for in a step. Do not throw away any packing material until you account for all the parts.

IMPORTANT: Save all of the Computer's assembled circuit board and disk drive packaging in case it ever becomes necessary to return the Computer, or any part of it, to the factory for service.

To order a replacement part, always include the PART NUMBER. Use the Parts Order Form furnished with this kit. If a Parts Order Form is not available, refer to "Replacement Parts" inside the rear cover of this Manual.

ELECTRONIC ASSEMBLIES

KEY No.	HEATH Part No.	QTY	DESCRIPTION
A1	131-8	1	Floppy disk drive
A2	163-40-3	1	Keyboard
	150-307-1	1	Video board
	150-310	1	Drive controller board
A3	181-7597	1	Lock assembly
	181-6790	1	Backplane board
	181-6875	1	I/O (Input/Output) board
	181-7043	1	CPU board
	181-7045	1	1M memory board
A4	234-859	1	Power supply

METAL PARTS

KEY No.	HEATH Part No.	QTY	DESCRIPTION
B1	90-1368-1	1	Cover
B2	200-1563-1	1	Main chassis
B3	200-1546	2	Disk drive chassis
B4	204-2721	5	Small cover plate
B5	204-2886	1	Power supply baffle
B6	204-2968	1	Floppy drive bracket
B7	204-3107	2	Winchester drive bracket
B8	204-3123	1	Fan baffle
B9	205-2052	1	Fan mounting plate
B10	206-1542	1	Finger guard

HARDWARE

NOTE: The hardware is shown full size so you can place any nut, screw, etc. that you have difficulty identifying over the drawing. Also, the hardware may be packed in more than one envelope. Open all of the envelopes (marked HDW) before you check the hardware against the Parts List.

KEY No.	HEATH Part No.	QTY	DESCRIPTION
C1	250-1557	2	6-32 × 3/16" screw
C2	250-1307	1	#6 × 1/4" sheet metal screw
C3	250-1538	31	6-32 × 1/4" screw (at least one extra)
C4	250-1325	5	6-32 × 1/4" black screw
C5	250-1516	6	6-32 × 5/16" screw
C6	250-1434	14	#6 × 3/8" self-tapping screw
C7	250-1150	12	6-32 × 1/2" screw
C8	810-9	4	M3 × 6 mm screw
C9	252-799	4	6-32 locknut
C10	253-60	9	#6 flat washer
C11	258-730	4	Retainer
C12	258-775	1	Chassis spring
C13	258-782	1	Cover spring
C14	266-1243	1	Spring retainer

CABLES

KEY No.	HEATH Part No.	QTY	DESCRIPTION
D1	89-65	1	Line cord
	134-1653	1	Printer cable
D2	134-1674	1	34-conductor cable

KEY No.	HEATH Part No.	QTY	DESCRIPTION

MISCELLANEOUS

E1	73-253	1	Gasket
E2	94-654	1	Card guide adaptor
E3	94-682	1	Card guide
E4	203-2332-1	1	Front panel
E5	203-2333-1	3	Drive cover panel
E6	261-49	1	Square foot
E7	261-64	5	Round cork foot
E8	354-5	1	Cable tie
E9	391-692	1	Computer nameplate
E10	391-714	1	H-386 nameplate
E11	418-42	1	3.6-volt lithium battery
E12	420-661-2	1	Fan

PRINTED MATERIALS

F1	390-2488	1	Warning label*
F2		1	Blue and white label*
		1	Owner's Manual (see Page 1 for the part number)
		1	Assembly Manual (see Page 1 for the part number)
	597-260	1	Parts Order Form*
	597-1656-5	1	HUG application*
	597-1659	1	HUG return envelope*
	597-4774	1	Video Drive Installation Guide
	890-965	1	Video Drive Disk

KEY No.	HEATH Part No.	QTY	DESCRIPTION

BINDER PARTS**

G1	250-357	2	6-32 × 3/8″ nylon screw
G2	252-3	2	6-32 nut
G3	253-14	2	#6 flat washer
	597-4460	1	Binder cover
	701-233	1	3-ring binder

* These parts may be packed inside one of the Manuals.
** These items are used to make up the Assembly Manual.

CHASSIS ASSEMBLY

Refer to Pictorial 1-1 for the following steps.

( ) Refer to Detail 1-1A and position the chassis on its rear panel. Then peel the backing from the five round cork feet and press a foot onto each of the embossed chassis bottom locations.

( ) Reposition the chassis as shown in the Pictorial.

NOTE: In the following steps, you will install parts using two different colors of 6-32 × 1/4″ screws. Use the silver-colored screws unless a step specifically calls for the **black** 1/4″ screws.

( ) Refer to Detail 1-1B and slide the two front mounting flanges of the power supply under the chassis tabs at A and B. Loosely mount the two rear mounting flanges of the power supply to the chassis bottom at AA and AB with 6-32 × 3/16″ screws. Secure the power supply to the rear panel at D and E with 6-32 × 1/4″ **black** screws. Then tighten the two screws that secure the two rear mounting flanges of the power supply to the chassis bottom.

( ) Refer to Detail 1-1C and loosely mount the baffle to the power supply with two 6-32 × 1/4″ screws.

( ) Refer to Detail 1-1C and secure the baffle to the rear panel at C with a 6-32 × 1/4″ **black** screw. Then tighten the two screws that secure the baffle to the power supply.

( ) Place the chassis spring over the three rear mounting spacers at H, J, and K with the spring fingers pointing down.

( ) Place the spring retainer on top of the chassis spring as shown. Be sure the shorter end of the retainer is near spacer H, and the small bosses on the retainer point up.

( ) Place the backplane board (#181-6790) onto the ten mounting spacers and start a 6-32 × 1/2" screw into each spacer. After all ten screws have been started into the spacers, tighten the screws.

WARNING: A fire, explosion, and severe burn hazard exists from the lithium battery. Do not short circuit, attempt to charge, force overdischarge, disassemble, crush, penetrate, incinerate, or heat the battery above 72° C (162° F), or it may leak or explode.

( ) Refer to inset drawing #1 in Pictorial 1-1 and install the lithium battery into the batteryholder on the backplane board. Position the positive (+) end of the battery as shown.

( ) Refer to inset drawing #2 in Pictorial 1-1 and mount the solder lug attached to the black power supply lead, and the ground plate attached to the keyboard connector, to the chassis at L. Use a 6-32 × 1/4"screw.

( ) Refer to Detail 1-1D and position the fan mounting plate with the two small mounting holes and four studs as shown. With the lettered side of the finger guard toward you, place it over the four studs of the fan mounting plate. Then place the gasket over the four studs.

( ) Again refer to Detail 1-1D and place the fan over the four studs of the fan mounting plate. Be sure you position the fan so its two wires exit the fan as shown.

( ) Again refer to Detail 1-1D and place the tabs of the fan baffle over the two indicated studs of the fan mounting plate. Then start a 6-32 locknut on each of the four studs. Be sure the gasket is properly positioned; then carefully tighten all of the nuts, but do not overtighten them as you may break the corners of the fan.

( ) Using two 6-32 × 1/4" black screws, mount the fan assembly to the inside rear of the main chassis at the location shown. NOTE: Be sure the fan mounting plate rests inside the flange at the bottom of the main chassis cutout before you install the screws.

( ) Refer to inset drawing #3 in Pictorial 1-1 and push 2-pin plug P2, coming from the fan, into P129 on the backplane board.

( ) Push 15-pin plug P1, coming from the power supply, into P128 on the backplane board.

NOTE: In the following steps, be sure to handle the speaker carefully to avoid damage to the fragile speaker cone.

( ) Cut the cable tie that holds the keys to the lock assembly, and remove the keys.

( ) Mount the lock assembly to the chassis front panel at P and R with two 6-32 × 1/4" screws. Place a #6 flat washer between the lock assembly and the front panel at P. Position the solder lug from the cables under the lock assembly mounting foot at R as shown. Position the cables so they extend from the top of the assembly. Use care when handling the assembly so you do not break any wires connected to the switch or speaker. Be sure the leads connected to the solder lug do not touch the lugs on the switch or any part of the lock.

( ) Position the speaker wires toward the top of the card guide. Then, while you spread the two posts with catches apart, carefully push the speaker down between the four posts until it rests on their shoulders.

( ) Align the card guide over its panel mounting holes and snap it into the panel. Then position the two cables from the lock assembly toward the center of the chassis as shown.

( ) Refer to inset drawing #4 in Pictorial 1-1 and use the cable tie to secure the cables coming from the lock assembly to the card guide at the indicated location. Cut off the excess cable tie.

( ) Remove the backing paper from the square foot. Then press the foot against the outside front of the chassis at the indicated location, as shown in inset drawing #5 in Pictorial 1-1.

Set the chassis aside temporarily.

DRIVE INSTALLATION

When you purchased your Computer system, you may have ordered it with one floppy disk drive or, optionally, with two floppy disk drives and possibly one or two Winchester drives. Two identical disk drive chassis are used in your Computer; in each one, you can mount a Winchester drive in the lower position and a floppy disk drive in the upper position. The following instructions reflect the installation and drive numbering used in the factory assembled version of your Computer (see Figure 1). However, you may want to mount or number your drives differently.

IMPORTANT: Floppy disk and Winchester drive assemblies are precision devices that can be damaged by rough handling. Handle all drive assemblies only by their frames, and with special care. Use the same care in handling the Computer once a drive has been installed.

NOTES:

1. The illustrations used in this section may show a different number and/or style of drives than you will actually install in your Computer.

2. If you decide to add additional drives (of either type) at a later date, you can follow the instructions for installing them provided under the proper heading in the "Owner's Manual."

( ) Mark the side of one disk drive chassis with a piece of tape or felt-tip marker to distinguish it from the other one. This will be referred to as the **marked** drive chassis.

Refer to the following chart and locate the drive combination that applies to your Computer. Then proceed to the drive installation steps listed there.

	NUMBER OF DRIVES		PROCEED TO:
	FLOPPY	WINCHESTER	
( )	1	0	"One Floppy Drive," Page 8.
( )	2	0	"Two Floppy Drives," Page 9.
( )	1	1	"One Floppy and One Winchester Drive," Page 11.
( )	2	1	"Two Floppies and One Winchester Drive," Page 13.
( )	1	2	"One Floppy and Two Winchester Drive," Page 15.
( )	2	2	"Two Floppies and Two Winchester Drives," Page 18.

One Floppy Drive

( ) Position the marked disk drive chassis as shown in Pictorial 1-2.

( ) Refer to Pictorial 1-2 and install a Winchester drive bracket in the bottom location of the marked disk drive chassis using two 6-32 × 1/4" screws. Be sure to position the drive bracket with the wide space up as shown.

( ) Refer to Pictorial 1-2 and install the floppy drive bracket in the top location of the marked disk drive chassis using two 6-32 × 1/4" screws. Then set the marked drive chassis aside.

Refer to Pictorial 1-3 for the following steps.

( ) Position the unmarked disk drive chassis as shown in the Pictorial.

( ) Install another Winchester drive bracket in the bottom location of the unmarked disk drive chassis using two 6-32 × 1/4" screws. Be sure to position the drive bracket with the wide space up as shown.

( ) Carefully unpack the disk drive. NOTE: Do not remove the protective cardboard insert from the drive until you are directed to do so.

( ) Write the manufacturer's name and model number of your particular drive in the following blanks. You will need this information if you decide to add another 1.2M floppy disk drive later, or have to refer to the model number of your drive for some other reason.

Manufacturer's Name _____

Model Number _____

( ) Carefully set the drive into the top location of the unmarked disk drive chassis so it rests on the mounting tabs. Then start four 6-32 × 1/4" screws or four metric screws (depending on the particular drive you received) into the mounting holes. After all the screws have been started, tighten all the screws.

( ) Refer to the part of Pictorial 1-5 that corresponds to the drive you have, and check the programming jumpers to make sure the jumper sockets are positioned as shown. If they are not, move them to the proper locations. NOTE: You may have some leftover jumpers.

Refer to Pictorial 1-6 for the following steps.

( ) Refer to Detail 1-6A and set the **marked** disk drive chassis in the center of the main chassis as shown. Then slide it toward the front panel so the tab on the main chassis hooks the bottom of the disk drive chassis. Check to verify that the disk drive chassis has engaged the main chassis tab; then secure the disk drive chassis with a 6-32 × 1/2" screw.

( ) Refer to inset drawing #1 and connect the **end** socket on the 34-conductor cable to the connector on the rear of the floppy disk drive mounted on the unmarked disk drive chassis. Position the marked edge of the cable to the end of the drive connector identified with a "1" or "2" as shown.

( ) Set the unmarked disk drive chassis in the main chassis to the right of the marked disk drive chassis; then slide this chassis forward to engage the main chassis tab. Be sure the disk drive chassis has engaged the main chassis tab; then secure it with a 6-32 × 1/2" screw.

( ) Position the free end of the cable coming from the disk drive chassis over the rear panel to keep it out of the way.

( ) Refer to inset drawing #2 and connect P4, coming from the power supply, to the power connector on the floppy disk drive. NOTE: The connector is keyed so that it will only insert in the proper way.

( ) Position the unused power connectors neatly against the chassis.

Proceed to "Circuit Board Installation" on Page 21.

Two Floppy Drives

Refer to Pictorial 1-3 for the following steps.

( ) Install a Winchester drive bracket in the bottom location of the marked disk drive chassis using two 6-32 × 1/4" screws. Be sure to position the drive bracket with the wide space up as shown.

( ) Carefully unpack the **optional** disk drive you ordered with your kit. This may be a model ZD-12 or Z-207-7. NOTE: Do not remove the protective cardboard insert from the drive until you are instructed to do so.

If your optional drive is a Model ZD-14, 3-1/2" floppy disk drive, perform the installation instructions supplied with that drive.

( ) Write the manufacturer's name and model number of your particular drive in the following blanks. You will need this information if you have to refer to the model number of your drive for some reason.

Manufacturer's Name _____

Model Number _____

( ) Carefully set the drive into the top location of the **marked** disk drive chassis so it rests on the mounting tabs. Then start the four pan head screws supplied with the drive into the mounting holes. After all the screws have been started, tighten all the screws. Discard any flat head screws that may have been supplied with the drive.

If your **optional** drive is a Model Z-207-7, 360K drive, refer to Pictorial 1-4 and perform the following three steps.

( ) 1. Examine the drive installed in the marked chassis. Then determine which drive type shown in the Pictorial best resembles your optional drive.

If your optional drive resembles Drive Types A or B, move the programming jumper to **DS1**, if this has not already been done.

If your optional drive resembles Drive Types C or D, move the programming jumper(s) to **DS** and **2**, or **DS2**, if this has not already been done.

( ) 2. Again, refer to the Pictorial which best resembles your optional drive and cut the foil trace or wire jumper, OR, remove the jumper socket in series with the foil trace coming from pin 34 of the drive edge connector, if this has not already been done.

( ) 3. Use a small flat-blade screwdriver to remove the resistor termination pack from this drive only.

If your **optional** drive is a Model ZD-12, 1.2M drive, refer to the part of Pictorial 1-5 that corresponds to your drive and perform the following two steps.

( ) 1. Refer to the Pictorial and check the programming jumpers to make sure the jumper sockets are positioned as shown. If they are not, move them to the proper locations. NOTE: You may have some leftover jumpers.

( ) 2. Use a small flat-blade screwdriver to remove the resistor termination pack from this drive only.

Set the marked disk drive chassis aside.

Refer to Pictorial 1-3 for the following steps.

( ) Position the unmarked disk drive chassis as shown in the Pictorial.

( ) Install a Winchester drive bracket in the bottom location of the unmarked disk drive chassis using two 6-32 × 1/4″ screws. Be sure to position the drive bracket with the wide space up as shown.

( ) Carefully unpack the disk drive supplied with your kit. NOTE: Do not remove the protective cardboard insert from the drive until you are directed to do so.

( ) Write the manufacturer's name and model number of your particular drive in the following blanks. You will need this information if you have to refer to the model number of your drive for some reason.

Manufacturer's Name _____

Model Number _____

( ) Carefully set the drive into the top location of the unmarked disk drive chassis so it rests on the mounting tabs. Then start four 6-32 × 1/4″ screws or four metric screws (depending on the particular drive you received) into the mounting holes. After all the screws have been started, tighten all the screws.

( ) Refer to the part of Pictorial 1-5 that corresponds to your drive and check the programming jumpers to make sure the jumper sockets are positioned as shown. If they are not, move them to the proper locations. NOTE: You may have some leftover jumpers.

Set the disk drive chassis aside.

Refer to Pictorial 1-6 for the following steps.

( ) Refer to Detail 1-6A and set the **marked** disk drive chassis in the center of the main chassis as shown. Then slide it toward the front panel so the tab on the main chassis hooks the bottom of the disk drive chassis. Check to verify that the disk drive chassis has engaged the main chassis tab; then secure the disk drive chassis with a 6-32 × 1/2" screw.

( ) Refer to inset drawing #1 and connect the **end** socket on the 34-conductor cable to the connector on the rear of the floppy disk drive mounted on the **unmarked** disk drive chassis. Position the marked edge of the cable to the end of the drive connector identified with a "1" or "2" as shown.

( ) Set the unmarked disk drive chassis in the main chassis to the right of the marked disk drive chassis; then slide this chassis forward to engage the main chassis tab. Be sure the disk drive chassis has engaged the main chassis tab; then secure it with a 6-32 × 1/2" screw.

( ) Refer to Detail 1-6B and connect the remaining socket on the 34-conductor cable coming from the floppy disk drive on the unmarked disk drive chassis to the connector of the floppy disk drive on the marked disk drive chassis. Position the marked edge of the cable to the end of the drive connector identified with a "1" or "2" as shown. Then position the free end of this cable over the rear panel to keep it out of the way.

( ) Check to be sure the resistor termination pack has been removed from the second floppy disk drive (mounted on the **marked** disk drive chassis).

Refer to inset drawing #2 and connect the 4-pin power connectors coming from the power supply to the power connectors on the drives as follows. NOTE: These connectors are keyed so they will only insert in the proper way.

( ) The connector marked P2 to the floppy disk drive mounted on the **marked** disk drive chassis.

( ) The connector marked **P4** to the other floppy disk drive.

( ) Position the unused power connectors neatly against the chassis.

Proceed to "Circuit Board Installation" on Page 21.

One Floppy and One Winchester Drive

Refer to Pictorial 1-7 for the following steps.

( ) Position the **marked** disk drive chassis as shown in the Pictorial.

( ) Carefully unpack a Winchester drive (Model HWD-20-AT, ZD-200, ZD-400, or ZD-800); be sure to handle it by its frame. Mark down the drive model and type number in the spaces provided below. This information is available from your drive or listed in the chart in Figure 2. NOTE: You will need the drive type to make the correct entry when you perform the Setup routine later.

DRIVE MODEL _____ DRIVE TYPE _____

( ) Refer to Detail 1-7A Part A, Part B, Part C, or Part D (see below) and be sure the programming jumper is set for DS1 or S1. Remove any other programming jumpers that may be installed at this bank of pins.

For Model HW-20-AT, 20M drive, refer to Part A.

For Model ZD-200, 20M drive, refer to Part B.

For Model ZD-400, 40M drive, refer to Part C.

For Model ZD-800, 80M drive, refer to Part D.

NOTE: In the following step, you may use either one of the two sets of drive-mounting holes.

( ) Mount the drive in the lower disk drive chassis position of the marked chassis with the screws supplied with the drive. Position the drive with the circuit board connectors down as shown in inset drawing #2 on Pictorial 1-8. Start all four screws into their holes first; then tighten the screws. NOTE: If you have a half-height Winchester drive and you want it to show through the cutout in the front panel, mount the drive in the Winchester drive chassis as shown in inset drawing #1. Also, be sure you have properly programmed the drive before you continue. Once the disk drive chassis is installed in the main chassis, you will no longer have easy access to the programming jumpers on the Winchester drive.

( ) Install the drive bracket in the top location of the marked disk drive chassis. Use two 6-32 × 1/4" screws.

( ) Refer to Detail 1-7B and install a 34-conductor cable (packed separately as model Z-417-1 if you have the ZD-200, ZD-400, or ZD-800 drive only) and a 20-conductor cable (packed with the Winchester drive) onto the connectors at the rear of the Winchester drive. Position the marked edge of each cable toward the end of the connector identified with a "1" or "2" as shown. The other ends of these cables will be connected later.

Set this disk drive chassis aside temporarily.

Refer to Pictorial 1-3 for the following steps.

( ) Position the unmarked disk drive chassis as shown in the Pictorial.

( ) Install a Winchester drive bracket in the bottom location of the unmarked disk drive chassis using two 6-32 × 1/4" screws. Be sure to mount the drive bracket so the wide space is up as shown.

( ) Carefully unpack the floppy disk drive. NOTE: Do not remove the protective cardboard insert from the drive until you are directed to do so.

( ) Write the manufacturer's name and model number of your particular drive in the following blanks. You will need this information if you decide to add an additional 1.2M floppy disk drive later, or have to refer to the model number of your drive for some other reason.

Manufacturer's Name _____

Model Number _____

( ) Carefully set the drive into the top location of the unmarked disk drive chassis so it rests on the mounting tabs. Then start four 6-32 × 1/4" screws or four metric screws (depending on the particular drive you received) into the mounting holes. After all the screws have been started, tighten all the screws.

( ) Refer to the part of the Pictorial 1-4 that corresponds to your drive and check the programming jumpers to make sure the jumper sockets are positioned as shown. If they are not, move them to the proper locations. NOTE: You may have some leftover jumpers.

Set this disk drive chassis aside.

Refer to Pictorial 1-8 for the following steps.

( ) Refer to Detail 1-8A and set the **marked** disk drive chassis in the center of the main chassis. Then slide it toward the front panel so the tab on the main chassis hooks the bottom of the disk drive chassis. Make sure the disk drive chassis has engaged the main chassis tab; then secure the disk drive chassis with a 6-32 × 1/2" screw.

( ) Position the free ends of the cables coming from the Winchester drive over the rear panel to keep them out of the way.

( ) Refer to inset drawing #1 and connect the **end** socket on the 34-conductor cable to the connector on the rear of the floppy disk drive mounted on the unmarked disk drive chassis. Position the marked edge of the cable to the end of the drive connector identified with a "1" or "2" as shown.

( ) Set the unmarked disk drive chassis in the main chassis to the right of the marked disk drive chassis; then slide this chassis forward to engage the main chassis tab. Be sure the disk drive chassis has engaged the main chassis tab; then secure it with a 6-32 × 1/2″ screw. Position the end of the cable coming from the floppy drive over the rear panel to keep it out of the way.

Refer to the inset drawing #2 and connect the 4-pin power connectors coming from the power supply to the power connectors on the drives as follows. NOTE: These connectors are keyed so they will only insert in the proper way.

( ) The connector marked P4 to the floppy disk drive.

( ) The connector marked P3 to the Winchester drive.

( ) Position the unused power connectors neatly against the chassis.

Proceed to "Circuit Board Installation" on Page 21.

Two Floppies and One Winchester Drive

Refer to Pictorial 1-9 for the following steps.

( ) Position the **marked** disk drive chassis as shown in the Pictorial.

( ) Carefully unpack a Winchester drive (model HWD-20-AT, ZD-200, ZD-400, or ZD-800); be sure to handle it by its frame. Mark down the drive model and type number in the spaces provided below. This information is available from your drive or listed in the chart in Figure 2. NOTE: You will need the drive type to make the correct entry when you perform the Setup routine later.

DRIVE MODEL _____ DRIVE TYPE _____

( ) Refer to Detail 1-7A Part A, Part B, Part C, or Part D (see below) and be sure the programming jumper is set for DS1 or S1. Remove any other programming jumpers that may be installed at this bank of pins.

For Model HWD-20-AT, 20M drive, refer to Part A.

For Model ZD-200, 20M drive, refer to part B.

For Model ZD-400, 40M drive, refer to Part C.

For Model ZD-800, 80M drive, refer to Part D.

NOTE: In the following step, you may use either one of the two sets of drive-mounting holes.

( ) Mount the drive in the lower disk drive chassis position of the marked chassis with the screws supplied with the drive. Position the drive with the circuit board connectors down as shown in Detail 1-7B. Start all four screws into their holes first; then tighten the screws. NOTE: If you have a half-height Winchester drive and you want it to show through the cutout in the front panel, mount the drive in the Winchester drive chassis as shown in inset drawing #1. Also, be sure you have properly programmed the drive before you continue. Once the disk drive chassis is installed in the main chassis, you will no longer have easy access to the programming jumpers on the Winchester drive.

( ) Refer to Detail 1-7B and install a 34-conductor cable (packed separately as Model Z-417-1 if you have the ZD-200, ZD-400, or ZD-800 drive only) and a 20-conductor cable (packed with the Winchester drive) onto the connectors at the rear of the Winchester drive. Position the marked edge of each cable toward the end of the connector identified with a "1" or "2" as shown. The other ends of these cables will be connected later.

( ) Carefully unpack the **optional** disk drive you ordered with your kit. This may be a Model ZD-12 or Z-207-7. NOTE: Do not remove the protective cardboard insert from the drive until you are instructed to do so.

( ) Write the manufacturer's name and model number of your particular drive in the following blanks. You will need this information if you have to refer to the model number of your drive for some reason.

Manufacturer's Name _____

Model Number _____

( ) Carefully set the drive into the top location of the **marked** disk drive chassis so it rests on the mounting tabs. Then start the four pan head or hex head screws supplied with the drive into the mounting holes. After all the screws have been started, tighten all the screws. Discard any flat head screws that may have been supplied with the drive.

If your **optional** drive is a model Z-207-7, 360K drive, refer to Pictorial 1-4 and perform the following three steps.

( ) 1. Examine the drive installed in the marked chassis. Then determine which drive type shown in the Pictorial best resembles your optional drive.

If your optional drive resembles Drive Types A or B, move the programming jumper to **DS1**, if this has not already been done.

If your optional drive resembles Drive Types C or D, move the programming jumper(s) to **DS** and **2**, or **DS2**, if this has not already been done.

( ) 2. Again, refer to the Pictorial which best resembles your optional drive and cut the foil trace or wire jumper, OR, remove the jumper socket in series with the foil trace coming from pin 34 of the drive edge connector, if this has not already been done.

( ) 3. Use a small flat-blade screwdriver to remove the resistor termination pack from this drive only.

If your **optional** drive is a model ZD-12, 1.2M drive, refer to Pictorial 1-5 and perform the following two steps.

( ) 1. Refer to the part of the Pictorial that corresponds to your drive and check the programming jumpers to make sure the jumper sockets are positioned as shown. If they are not, move them to the proper locations. NOTE: You may have some leftover jumpers.

( ) 2. Use a small flat-blade screwdriver to remove the resistor termination pack from this drive only.

Set this disk drive chassis aside.

Refer to Pictorial 1-3 for the following steps.

( ) Position the unmarked disk drive chassis as shown in the Pictorial.

( ) Install a Winchester drive bracket in the bottom location of the unmarked disk drive chassis using two 6-32 × 1/4" screws. Be sure to position the drive bracket so the wide space is up as shown.

( ) Carefully unpack the disk drive supplied with your kit. NOTE: Do not remove the protective cardboard insert from the drive until you are directed to do so.

( ) Write the manufacturer's name and model number of your particular drive in the following blanks. You will need this information if you have to refer to the model number of your drive for some reason.

Manufacturer's Name _____

Model Number _____

( ) Carefully set the drive into the unmarked disk drive chassis so it rests on the mounting tabs. Then start four 6-32 × 1/4" screws or four metric screws (depending on the particular drive you received) into the mounting holes. After all the screws have been started, tighten all the screws.

( ) Refer to the part of Pictorial 1-5 that corresponds to your drive and check the programming jumpers to make sure the jumper sockets are positioned as shown. If they are not, move them to the proper locations. NOTE: You may have some leftover jumpers.

Set this disk drive chassis aside.

Refer to Pictorial 1-8 for the following steps.

( ) Refer to Detail 1-8A and set the **marked** disk drive chassis in the center of the main chassis. Then slide it toward the front panel so the tab on the main chassis hooks the bottom of the disk drive chassis. Make sure the disk drive chassis has engaged the main chassis tab; then secure the disk drive chassis with a 6-32 × 1/2" screw.

( ) Position the free ends of the cables coming from the Winchester drive over the rear panel to keep them out of the way.

( ) Refer to inset drawing #1 and connect the **end** socket on the 34-conductor cable to the connector on the rear of the floppy disk drive mounted on the unmarked disk drive chassis. Position the marked edge of the cable to the end of the drive connector identified with a "1" or "2" as shown.

( ) Set the unmarked disk drive chassis in the main chassis to the right of the marked disk drive chassis; then slide this chassis forward to engage the main chassis tab. Be sure the disk drive chassis has engaged the main chassis tab; then secure it with a 6-32 × 1/2" screw.

( ) Refer to Detail 1-8C and connect the remaining socket on the 34-conductor cable coming from the floppy disk drive on the unmarked disk drive chassis to the connector of the floppy disk drive on the marked disk drive chassis. Position the marked edge of the cable to the end of the drive connector identified with a "1" or "2" as shown. Then position the end of this cable over the rear panel.

( ) Check to be sure that the resistor termination pack has been removed from the floppy disk drive mounted on the marked disk drive chassis.

Refer to inset drawing #2 and connect the 4-conductor power connectors coming from the power supply to the power connectors on the drives as follows. NOTE: These connectors are keyed so they will only insert in the proper way.

( ) The connector marked P2 to the floppy disk drive on the marked disk drive chassis.

( ) The connector marked P3 to the Winchester drive.

( ) The connector marked P4 to the floppy disk drive mounted on the unmarked disk drive chassis.

( ) Position the unused power connector neatly against the chassis.

Proceed to "Circuit Board Installation" on Page 21.

One Floppy and Two Winchester Drives

Refer to Pictorial 1-7 for the following steps.

( ) Position the **marked** disk drive chassis as shown in the Pictorial.

( ) Carefully unpack a Winchester drive (Model HWD-20-AT, ZD-200, ZD-400, or ZD-800); be sure to handle it by its frame. Mark down the drive model and type number in the spaces provided below. This information is available from your drive or listed in the chart in Figure 2. NOTE: You will need the drive type to make the correct entry when you perform the Setup routine later.

First Drive: DRIVE MODEL _____

DRIVE TYPE _____

NOTE: The 34-conductor cable used with the Winchester drives allows each drive to be set for the same drive select number. Therefore, each Winchester drive you install should be programmed for drive select #1 (**DS1**), as in the following step.

( ) Refer to Detail 1-7A Part A, Part B, Part C, or Part D (see below) and be sure the programming jumper is set for DS1 or S1. Remove any other programming jumpers that may be installed at this bank of pins.

For Model HWD-20-AT, 20MB drive, refer to Part A.

For Model ZD-200, 20M drive, refer to Part B.

For Model ZD-400, 40M drive, refer to Part C.

For Model ZD-800, 80M drive, refer to Part D.

NOTE: In the following step, you may use either one of the two sets of drive-mounting holes.

( ) Mount the drive in the lower disk drive chassis position of the marked chassis with the screws supplied with the drive. Position the drive with the circuit board connectors down as shown in Detail 1-7B. Start all four screws into their holes first; then tighten the screws. NOTE: If you have a half-height Winchester drive and you want it to show through the cutout in the front panel, mount the drive in the Winchester drive chassis as shown in inset drawing #1. Also, be sure you have properly programmed the drive before you continue. Once the disk drive chassis is installed in the main chassis, you will no longer have easy access to the programming jumpers on the Winchester drive.

( ) Install the drive bracket in the top location of the marked disk drive chassis using two 6-32 × 1/4″ screws.

( ) Refer to Detail 1-7B and install a 34-conductor cable (packed separately as Model Z-417-1) and a 20-conductor cable (packed with the Winchester drive) onto the connectors at the rear of the Winchester drive. Position the marked edge of each cable toward the end of the connector identified with a "1" or "2" as shown. The other ends of these cables will be connected later. NOTE: If you purchased the HWD-20-AT drive, discard the 34-conductor cable that was supplied with it.

Set this disk drive chassis aside.

Refer to Pictorial 1-9 for the following steps.

( ) Position the unmarked disk drive chassis as shown in the Pictorial.

( ) Carefully unpack a Winchester drive (Model HWD-20-AT, ZD-200, ZD-400, or ZD-800); be sure to handle it by its frame. Mark down the drive model and type number in the spaces provided below. This information is available from your drive or listed in the chart in Figure 2. NOTE: You will need the drive type to make the correct entry when you perform the Setup routine later.

Second Drive: DRIVE MODEL ZD- _____

DRIVE TYPE _____

( ) Refer to Detail 1-7A Part A, Part B, Part C, or Part D (see below) and be sure the programming jumper is set for DS1 or S1. Remove any other programming jumpers that may be installed at this bank of pins.

For Model HWD-20-AT, 20M drive, refer to Part A.

For Model ZD-200, 20M drive, refer to Part B.

For Model ZD-400, 40M drive, refer to Part C.

For Model ZD-800, 80M drive, refer to Part D.

NOTE: In the following step, you may use either one of the two sets of drive-mounting holes.

( ) Mount the drive in the lower disk drive chassis position of the unmarked chassis with the screws supplied with the drive. Position the drive with the circuit board connectors down as shown in Detail 1-7B. Start all four screws into their holes first; then tighten the screws. NOTE: If you have a half-height Winchester drive and you want it to show through the cutout in the front panel, mount the drive in the Winchester drive chassis as shown in inset drawing #1. Also, be sure you have properly programmed the drive before you continue. Once the disk drive chassis is installed in the main chassis, you will no longer have easy access to the programming jumpers on the Winchester drive.

( ) Refer to Detail 1-7B and install a 20-conductor cable (packed with the Winchester drive) onto the connector at the rear of the Winchester drive. Position the marked edge of the cable toward the end of the connector identified with a "1" or "2" as shown. The other end of this cable will be connected later. NOTE: If you are installing an HWD-20-AT drive as a second Winchester drive, you will need a different 20-conductor cable (#134-1656).

( ) Refer to Detail 1-7A Part A, Part B, Part C, or Part D and use a small screwdriver to remove the resistor termination pack from this Winchester drive only.

( ) Carefully unpack the floppy disk drive supplied with your kit. NOTE: Do not remove the protective cardboard insert from the drive until you are directed to do so.

( ) Write the manufacturer's name and model number of your particular drive in the following blanks. You will need this information if you decide to add another 1.2M floppy disk drive later, or have to refer to the model number of your drive for some other reason.

Manufacturer's Name _____

Model Number _____

( ) Carefully set the drive into the top location of the unmarked disk drive chassis so it rests on the mounting tabs. Then start four 6-32 × 1/4" screws or four metric screws (depending on the particular drive you received) into the mounting holes. After all the screws have been started, tighten all the screws.

( ) Refer to the part of Pictorial 1-5 that corresponds to your drive and check the programming jumpers to make sure the jumper sockets are positioned as shown. If they are not, move them to the proper locations. NOTE: You may have some leftover jumpers.

Set this disk drive chassis aside.

Refer to Pictorial 1-8 for the following steps.

( ) Refer to Detail 1-8A and set the **marked** disk drive chassis in the center of the main chassis. Then slide it toward the front panel so the tab on the main chassis hooks the bottom of the disk drive chassis. Make sure the disk drive chassis has engaged the main chassis tab; then secure the disk drive chassis with a 6-32 × 1/2" screw.

( ) Position the free ends of the cables coming from the Winchester drive over the rear panel to keep them out of the way.

( ) Refer to inset drawing #1 and connect the **end** socket on the 34-conductor cable to the connector on the rear of the floppy disk drive mounted on the unmarked disk drive chassis. Position the marked edge of the cable to the end of the drive connector identified with a "1" or "2" as shown.

( ) Place the unmarked disk drive chassis into the main chassis from the right side of the main chassis so that the connectors on the rear of the Winchester drive face toward the other drive chassis.

( ) Connect the 4-pin power connector marked P5, coming from the power supply, to the power connector on the unmarked Winchester drive in the unmarked disk drive chassis.

( ) Refer to Detail 1-8B and connect the remaining socket on the 34-conductor cable coming from the Winchester drive mounted on the **marked** disk drive chassis to the drive mounted on the unmarked chassis. Position the marked edge of the cable to the end of the drive connector identified with a "1" or "2" as shown.

( ) Reposition the unmarked disk drive chassis in the main chassis so that the front of the drive chassis faces toward the front of the main chassis. Then slide the drive chassis forward to engage the main chassis tab. Be sure the disk drive chassis has engaged the main chassis tab; then secure it with a 6-32 × 1/2" screw. Position the ends of the cables coming from the unmarked disk drive chassis over the rear panel to keep them out of the way.

Refer to inset drawing #2 and connect the 4-conductor power connectors coming from the power supply to the power connectors on the drives as follows. NOTE: These connectors are keyed so they will only insert in the proper way.

( ) The connector marked P3 to the Winchester drive mounted in the marked chassis.

( ) The connector marked P4 to the floppy disk drive.

( ) Position the unused power connector neatly against the chassis.

Proceed to "Circuit Board Installation" on Page 21.

Two Floppies and Two Winchester Drives

Refer to Pictorial 1-9 for the following steps.

( ) Position the **marked** disk drive chassis as shown in the Pictorial.

( ) Carefully unpack a Winchester drive (Model HWD-20-AT, ZD-200, ZD-400, or ZD-800); be sure to handle it by its frame. Mark down the drive model and type number in the spaces provided below. This information is available from your drive or listed in the chart in Figure 2. NOTE: You will need the drive type to make the correct entry when you perform the Setup routine later.

First Drive: DRIVE MODEL _____

DRIVE TYPE _____

NOTE: The 34-conductor cable used with the Winchester drives allows each drive to be set for the same drive select number. Therefore, each Winchester drive you install should be programmed for drive select #1 (**DS1**), as in the following step.

( ) Refer to Detail 1-7A Part A, Part B, Part C, or Part D (see below) and be sure the programming jumper is set for DS1 or S1. Remove any other programming jumpers that may be installed at this bank of pins.

For Model HWD-20-AT, 20M drive, refer to Part A.

For Model ZD-200, 20M drive, refer to Part B.

For Model ZD-400, 40M drive, refer to Part C.

For Model ZD-800, 80M drive, refer to Part D.

NOTE: In the following step, you may use either one of the two sets of drive-mounting holes.

( ) Mount the drive in the lower disk drive chassis position of the marked chassis with the screws supplied with the drive. Position the drive with the circuit board connectors down as shown in Detail 1-7B. Start all four screws into their holes first; then tighten the screws. NOTE: If you have a half-height Winchester drive and you want it to show through the cutout in the front panel, mount the drive in the Winchester drive chassis as shown in inset drawing #1. Also, be sure you have properly programmed the drive before you continue. Once the disk drive chassis is installed in the main chassis, you will no longer have easy access to the programming jumpers on the Winchester drive.

( ) Refer to Detail 1-7B and install a 34-conductor cable (packed separately as Model Z-417-1) and a 20-conductor cable (packed with the Winchester drive) onto the connectors at the rear of the Winchester drive. Position the marked edge of each cable toward the end of the connector identified with a "1" or "2" as shown. The other ends of these cables will be connected later. NOTE: If you purchased the HWD-20-AT drive, discard the 34-conductor cable that was supplied with it.

( ) Carefully unpack the **optional** disk drive you ordered with your kit. This may be a Model ZD-12 or Z-207-7. NOTE: Do not remove the protective cardboard insert from the drive until you are instructed to do so.

( ) Write the manufacturer's name and model number of your particular drive in the following blanks. You will need this information if you have to refer to the model number of your drive for some reason.

Manufacturer's Name _____

Model Number _____

( ) Carefully set the drive into the **marked** disk drive chassis so it rests on the mounting tabs. Then start the four pan head or hex head screws supplied with the drive into the mounting holes. After all the screws have been started, tighten all the screws. Discard any flat head screws that may have been supplied with the drive.

If your **optional** drive is a model Z-207-7, 360K drive, refer to Pictorial 1-4 and perform the following three steps.

( ) 1. Examine the drive installed in the marked chassis. Then determine which drive type shown in the Pictorial best resembles your optional drive.

If your optional drive resembles Drive Types A or B, move the programming jumper to **DS1**, if this has not already been done.

If your optional drive resembles Drive types C or D, move the programming jumper(s) to **DS** and **2**, or **DS2**, if this has not already been done.

( ) 2. Again, refer to the Pictorial which best resembles your optional drive and cut the foil trace or wire jumper, OR, remove the jumper socket in series with the foil trace coming from pin 34 of the drive edge connector, if this has not already been done.

( ) 3. Use a small flat-blade screwdriver to remove the resistor termination pack from this drive only.

If your **optional** drive is a 1.2M drive, refer to the part of Pictorial 1-5 that corresponds to your drive and perform the following two steps.

( ) 1. Refer to the Pictorial and check the programming jumpers to make sure the jumper sockets are positioned as shown. If they are not, move them to the proper locations. NOTE: You may have some leftover jumpers.

( ) 2. Use a small flat-blade screwdriver to remove the resistor termination pack from this drive only.

Set this disk drive chassis aside.

Refer to Pictorial 1-9 for the following steps.

( ) Position the unmarked disk drive chassis as shown in the Pictorial.

( ) Carefully unpack a Winchester drive (Model HWD-20-AT, ZD-200, ZD-400, or ZD-800); be sure to handle it by its frame. Mark down the drive model and type number in the spaces provided below. This information is available from your drive or listed in the chart in Figure 2. NOTE: You will need the drive type to make the correct entry when you perform the Setup routine later.

Second Drive: DRIVE MODEL _____

DRIVE TYPE _____

( ) Refer to Detail 1-7A Part A, Part B, Part C, or Part D (see below) and be sure the programming jumper is set for DS1 or S1. Remove any other programming jumpers that may be installed at this bank of pins.

For Model HWD-20-AT, 20M drive, refer to Part A.

For Model ZD-200, 20M drive, refer to Part B.

For Model ZD-400, 40M drive, refer to Part C.

For Model ZD-800, 80M drive, refer to Part D.

NOTE: In the following step, you may use either one of the two sets of drive-mounting holes.

( ) Mount the drive in the lower disk drive chassis position of the unmarked chassis with the screws supplied with the drive. Position the drive with the circuit board connectors down as shown in Detail 1-7B. Start all four screws into their holes first; then tighten the screws. NOTE: If you have a half-height Winchester drive and you want it to show through the cutout in the front panel, mount the drive in the Winchester drive chassis as shown in inset drawing #1. Also, be sure you have properly programmed the drive before you continue. Once the disk drive chassis is installed in the main chassis, you will no longer have easy access to the programming jumpers on the Winchester drive.

( ) Refer to Detail 1-7A Part A, Part B, Part C, or Part D and use a small screwdriver to remove the resistor termination pack from this Winchester drive only.

( ) Refer to Detail 1-7B and install a 20-conductor cable (packed with the Winchester drive) onto the connector at the rear of the Winchester drive. Position the marked edge of the cable toward the end of the connector identified with a "1" or "2" as shown. The other end of this cable will be connected later. NOTE: If you are installing an HWD-20-AT drive as a second Winchester drive, you will need a different 20-conductor cable (#134-1656).

( ) Carefully unpack the disk drive supplied with your kit. NOTE: Do not remove the protective cardboard insert from the drive until you are directed to do so.

( ) Write the Manufacturer's name and model number of your particular drive in the following blanks. You will need this information if you have to refer to the model number of your drive for some reason.

Manufacturer's Name _____

Model Number _____

( ) Carefully set the drive into the top location of the unmarked disk drive chassis so it rests on the mounting tabs. Then start four 6-32 × 1/4" screws or four metric screws (depending on the particular drive you received) into the mounting holes. After all the screws have been started, tighten all the screws.

( ) Refer to the part of Pictorial 1-5 that corresponds to your drive and check the programming jumpers to make sure the jumper sockets are positioned as shown. If they are not, move them to the proper locations. NOTE: You may have some leftover jumpers.

Set this disk drive chassis aside.

Refer to Pictorial 1-8 for the following steps.

( ) Refer to Detail 1-8A and set the **marked** disk drive chassis in the center of the main chassis. Then slide it toward the front panel so the tab on the main chassis hooks the bottom of the disk drive chassis. Make sure the disk drive chassis has engaged the main chassis tab; then secure the disk drive chassis with a 6-32 × 1/2" screws.

( ) Position the free ends of the cables coming from the Winchester drive over the rear panel to keep them out of the way.

( ) Refer to inset drawing #1 and connect the **end** socket on the 34-conductor cable to the connector on the rear of the floppy disk drive mounted on the unmarked disk drive chassis. Position the marked edge of the cable to the end of the drive connector identified with a "1" or "2" as shown.

( ) Place the unmarked disk drive chassis into the main chassis from the right side of the main chassis so that the connectors on the rear of the Winchester drive face toward the other drive chassis as shown in Detail 1-8A.

( ) Connect the 4-pin power connector marked P5, coming from the power supply, to the power connector on the unmarked Winchester drive.

( ) Refer to Detail 1-8B and connect the remaining socket on the 34-conductor cable coming from the Winchester drive mounted on the **marked** disk drive chassis to the drive mounted on the unmarked chassis. Position the marked edge of the cable to the end of the drive connector identified with a "1" or "2" as shown.

( ) Reposition the unmarked disk drive chassis in the main chassis so that the front of the drive chassis faces toward the front of the main chassis. Then slide the drive chassis forward to engage the main chassis tab. Be sure the disk drive chassis has engaged the main chassis tab; then secure it with a 6-32 × 1/2" screw.

( ) Position the ends of the cables coming from the unmarked disk drive chassis over the rear panel to keep them out of the way.

( ) Refer to Detail 1-8C and connect the remaining socket on the 34-conductor cable coming from the floppy disk drive on the unmarked disk drive chassis to the connector of the floppy disk drive on the marked disk drive chassis. Position the marked edge of the cable to the end of the drive connector identified with a "1" or "2" as shown. Then position the end of this cable over the rear panel.

( ) Check to be sure that the resistor termination pack has been removed from the second floppy disk drive mounted on the marked disk drive chassis.

Refer to inset drawing #2 and connect the remaining 4-conductor power connectors coming from the power supply to the power connectors on the drives as follows. NOTE: These connectors are keyed so they will only insert in the proper way.

( ) The connector marked P2 to the floppy disk drive mounted on the marked chassis.

( ) The connector marked P3 to the Winchester drive mounted in the marked chassis.

( ) The connector marked P4 to the floppy disk drive mounted on the unmarked chassis.

Proceed to "Circuit Board Installation."

CIRCUIT BOARD INSTALLATION

In the following steps, you will install the preassembled circuit boards, which may be packed in conductive plastic bags. To prevent the possibility of damage due to static discharges, leave each circuit board in its bag, or lay it on top of its bag, until you actually install it.

IMPORTANT: Save all of the circuit board packaging in case it ever becomes necessary to return a circuit board to the factory for service. Use the following procedure to install each circuit board.

1. Carefully remove the circuit board from its carton.

2. Grasp the bag with one hand and open it with the other.

3. Reach into the bag and remove the circuit board.

4. While holding the circuit board with one hand, touch the Computer chassis with the other to ensure that there is no potential difference between you and the circuit board or Computer.

5. Install the circuit board into its proper connectors on the backplane board. Make certain the edge connectors of the board enter the proper sockets on the backplane board, and the front edge of the board enters the slot in the card guide. Be sure the bracket of the circuit board enters the slot at the rear of the chassis; then secure the bracket and board with a 6-32 × 1/4" screw.

Refer to Pictorial 1-10 for the following steps.

( ) Refer to Detail 1-10A and install the card adaptor onto the card guide in position #2.

( ) Install the drive controller board into the backplane connectors nearest the disk drive chassis (position #1).

( ) Connect the 4-pin socket (labeled "A") coming from the lock assembly to connector J5 of the controller board. Position the connector with its wires as shown.

( ) Use the same procedure and install the I/O board in position #3 of the backplane board.

( ) Refer to inset drawing #1 and connect the 5-pin socket (labeled "B") coming from the lock assembly to P301 on the I/O board. Position the socket so that the black wire goes to pin 5.

( ) Insert a key into the lock and rotate it in both directions to the stop. Reposition any cable that interferes with the movement of the lock arm. Also check the cable leads connected to the solder lug at R to be sure neither touches the contacts of the switch mounted on the lock assembly. Then turn the key to its clockwise position and remove it.

( ) Remove the CPU board and lay it on top of its bag.

NOTES:

1. Perform only one of the following two numbered steps if you purchased one of the optional Numeric Coprocessors. Complete step #1 if you have the Model Z-416-2, 80287 option. Complete step #2 if you have the Model Z-516, 80387 option.

2. The integrated circuit you will install in the next step is an MOS (Metal Oxide Semiconductor) device. It is a rugged and reliable component once installed, but it can be damaged by static electricity as you install it. To prevent this, use the procedure described in Figure 3, without interruption, to install the IC.

( ) 1. Refer to inset drawing #2 in Pictorial 1-10 and install the 80287 IC at U256 on the CPU board.

( ) 2. Refer to inset drawing #3 in Pictorial 1-10 and install the 80387 IC at U213 on the CPU board.

Figure 4 shows the CPU board jumper sockets as they are installed by the manufacturer. The following table outlines alternate socket positions for the optional Numeric Coprocessors.

IF YOUR SYSTEM HAS:	SOCKETS ARE INSTALLED:
No coprocessor installed.	As shown in Figure 4.
An 80287 Numeric Coprocessor, 10 MHz.	On pins 2 and 3 of J204; other sockets installed as shown in Figure 4.
An 80287 Numeric Coprocessor, 6 or 8 MHz.	On pins 2 and 3 of J204; on pins 1 and 2 of J211; other sockets installed as shown in Figure 4.
An 80387 Numeric Coprocessor.	On pins 2 and 3 of J202; on pins 2 and 3 of J204; other sockets installed as shown in Figure 4.

( ) Follow the procedure used before and install the CPU board in backplane board position #4.

( ) Install the 1M memory board in backplane board position #6.

( ) If you purchased one or more additional memory expansion boards (Model Z-505, Z-515, or Z-525), follow the instructions supplied with those boards and install them in positions #5, #7, or #8. NOTE: The Model Z-525 expansion board must be installed in position #5.

( ) Locate DIP switch SW1 on the rear edge of the video board and jumpers P3 and P1. (See Figure 5.) Then locate the model number for your monitor in the chart in Figure 5, and set switch SW1 and jumpers P1 and P3 accordingly. NOTE: Disregard any pin number screened at P3 on the video board.

NOTE: If necessory, refer to Page 4-14 of your Owner's Manual for further information on switch SW1.

( ) Install the video board in position #2.

( ) Connect the free end of the 34-conductor cable coming from the floppy disk drive(s) to J1. Position the marked edge of the cable up.

( ) Recheck each circuit board to ensure that it is properly seated in the backplane connectors.

( ) Carefully peel the backing from the blue and white label. Then refer to inset drawing #4 and press the label onto the rear panel in the area shown. Be sure to refer to the numbers on the label in any correspondence you may have with the Heath Company about your Computer.

( ) Carefully remove the paper backing from the Warning label. Then refer to inset drawing #4 and press the label onto the rear panel in the area shown.

( ) Refer to Detail 1-10B and carefully remove the paper backing from the H-386 nameplate. Then press the nameplate onto the keyboard in the location shown.

Except for connecting the Winchester drive cables to the drive controller board and for the cover installation, this completes the assembly of your Computer. Proceed to "Diagnostic Tests."

DIAGNOSTIC TESTS

In the following tests, you will check your Computer to be sure it operates properly. Be sure to read and perform each test carefully.

IMPORTANT: If you turn the Computer off for some reason during these tests, you must wait at least 20 seconds before you can turn it back on. The power supply capacity is such that it takes 20 seconds for all voltages to drop low enough to ensure that a power-on reset will occur when power is reapplied.

INITIAL TESTS

Refer to Pictorial 2-1 for the following steps.

( ) Push the POWER switch on the rear of the Computer to OFF, if this has not already been done (press in on the side of the switch that does not have the dot).

( ) Set the LINE SELECT SWITCH for the proper AC voltage (115 VAC or 230 VAC). IMPORTANT: The line cord supplied with your kit is not suitable for 230 VAC. For 230 VAC operation, you must replace it with a cord approved for 230 VAC.

( ) Connect the line cord to the Computer. NOTE: A special shielded cord is supplied for 120 VAC operation. Be sure it is used only with your Computer. If it ever needs to be replaced, order an exact replacement cord (Heath part number 89-65).

( ) Match the pins in the end of the coiled cable coming from the keyboard assembly with the keyboard connector on the rear panel. Then insert the plug into the socket.

( ) Use an appropriate cable (not supplied) to connect your Monitor to the RGB VIDEO connector on the rear panel. Refer to the "Owner's Manual" for more information about these connectors.

( ) Connect your monitor to the AC line and turn it on so it can warm up.

( ) Turn the lever on the front of the disk drive(s) to its up (level) position. Then carefully remove the cardboard insert(s). Save the cardboard insert(s) for reinstallation when you transport the Computer. Do not install a disk in the drive(s) yet.

( ) Insert the key and rotate the lock to its clockwise (unlocked) position. NOTE: In the locked (counterclockwise) position, the keyboard is electronically disconnected, or "locked out," to prevent keyboard entries from interfering with a program being run. The lock also prevents the cover from being removed (if it is installed) when it is in the locked position.

NOTE: Listen carefully as you slowly rotate the key for a faint click as the microswitch in the lock assembly operates. It is possible that you may have to bend the switch lever upward slightly so that it clicks just before the lock lever reaches the fully unlocked position.

( ) Connect the line cord to an AC outlet.

( ) Push the POWER switch to ON. Both the power supply fan and the fan mounted on the rear panel should operate, the POWER (green) LED on the lock assembly should light, the speaker should beep, and all of the green LEDs on the backplane circuit board should light (see inset drawing #1). In addition, all of the red LEDs on the I/O circuit board should light initially and then go out, one by one, until only the INT, DSK, and RDY LEDs are lit (see inset drawing #2). You should then see the following error messages on the screen when your video monitor is correctly adjusted. NOTE: The battery message may not always appear.

```
+++ ERROR: Please replace the back-up battery! +++
+++ ERROR: Bad configuration information found in
CMOS! +++

--- Errors found! Please press <ESC> to continue ---
```

NOTES:

1. These error messages indicate that the backup battery was not previously installed (or should be replaced). They also indicate that no data from the Setup routine is present in memory (you have not completed this routine yet).

2. If you obtain a different error message, it provides clues as to where the problem is located. Write down any IC location "U" numbers that appear. Then turn the Computer off and carefully check the installation of each circuit board. Be sure the edge connectors of each board have entered their respective slots in the backplane board. Check that both sockets from the lock assembly are connected to their proper plugs on the disk controller and I/O boards. Then turn the POWER switch to on.

3. If you still do not get the proper error message, or if you get an error or failure message during the remaining tests, refer to the "Service Guide" and the servicing section of the "Owner's Manual."

4. If the monitor screen is blank, check the video cable and the installation and configuration of the video circuit board. (See your Owner's Manual.)

( ) Press the ESC key. The SETUP MENU will appear on the screen. Update the table to match the current hardware configuration of your Computer at this time. Remember that if you have any Winchester drives, they have not yet been connected; therefore, you must not include Winchester drives in the setup table at this time. Start by entering the time in 24-hour format without the colons; then press the ENTER/RETURN key. EXAMPLE: Enter 4:05 PM as 1605; then press ENTER/RETURN.

( ) Enter the date by month/day/year such as 06/12/1986 without the /'s and use all four year digits; then press the ENTER/RETURN key.

NOTE: In the following steps you will use the arrow keys to select the next portion of the menu.

( ) Press the SPACE BAR until 640K is displayed. NOTE: A 1M memory expansion board comes with your Computer, while the standard memory size is 640K. Of the remaining 360K of memory, 128K serves as a slush memory bank and 232K is used for the EMS.

( ) If you have an optional memory expansion board installed, press the "down arrow" key. Then press the SPACE BAR as many times as necessary to enter the correct expansion memory size. You can use the BACK SPACE key if you press the space bar too many times.

( ) Use the "arrow" keys to select the floppy drive 0 line. The 5-1/4", 1.2M drive is supplied as your standard drive 0. Use the SPACE BAR to select the proper drive, as necessary.

( ) If you have two floppy disk drives, use the "arrow" and SPACE BAR keys to select the 360K, 1.2M, or 3-1/2", 1.4M drive that you installed at "Floppy Drive 1."

( ) Use the "arrow" keys to select the "Boot Drive," and the SPACE BAR to select "Enter MFM-300 Monitor."

( ) Use the "arrow" keys to select "Video Display."

( ) Press the SPACE BAR to select "Enhanced Graphics" (because your Computer comes standard with the Z-449, 31 kHz video card).

( ) Leave the video refresh rate set for 60 Hz in order to minimize display flicker. Also, do NOT configure any Winchester drives you may have, as they are not connected at this time.

( ) Use the "arrow" keys of the keypad to select the "Operating Speed" line. Select the "smart" option, as this option employs the speed required to operate the floppy controller to insure that all "protected" disk operations are fully functional, while the memory can run at the higher speed. NOTE: If you select the "slow" option, the memory will run at the 8 MHz AT speed; it runs at the 386, 16 MHz speed if you select the "fast" option.

( ) The setup routine should be correct for this point in the construction. Press ESC, then Y(es), then ENTER/RETURN. After several seconds, the following monitor prompt should appear on the screen:

```
MFM-300 Monitor Version X.X
Memory Size:XXXK
Enter ''?'' for help.
->
```

NOTE: The Xs will be some number representing the version of the Monitor program, and the size of available memory.

( ) Type in the word "TEST" and then press the ENTER/RETURN key to enter the ROM-based diagnostics routine. The test menu should then appear on the screen.

NOTE: In the following steps, when a number key is called for, use the number key at the top of the keyboard. Do not use the number keys on the right side of the keyboard, as they are not recognized during these tests.

( ) Press the 5 key to start the Power-up Test. A counter should appear in the center of the screen, and it should begin to count up. Allow the count to reach 50 or more; then press the ESC key to end the test. Press ESC again to return to the test menu.

( ) Press the 4 key to start the Memory Expansion board test. A counter should again appear if this option is installed. Allow the count to reach at least 5 before pressing ESC to end the test. Press ESC again to return to the test menu. This test may take several minutes to complete each pass. NOTE: If this option is not present, a message to that effect will appear on the screen. Press ESC to return to the test menu.

NOTE: It takes several minutes to complete each pass of the following test. You should allow five complete passes, which last about 15 minutes, before you end the test. During these passes, you may want to review the contents of the "Owner's Manual" to learn more about your Computer's operation.

( ) Press the 3 key to start the basic system memory test. The speaker should "beep" several times a second during most of this test, with a double "beep" sounding after each pass through one section of memory. Near the end of each test pass, the monitor should display various test patterns. Allow the count to reach at least five before you press ESC to end the test; then press ESC again to return to the test menu.

( ) Press the 2 key to test the keyboard. Press each key and valid combinations of keys (such as shifted or uppercase keys) to see if they print properly and fill the screen. If you press a key that represents a nondisplayable character (such as F1), only the character code will be displayed in the upper right of the screen. Keys which modify the action of another key, such as the CTRL or SHIFT key, will do nothing unless you actually press the second key while the first is held down. This will fill the screen and/or display the character code. Press the ESC key to return to the test menu.

DISK-BASED DIAGNOSTIC TESTS

( ) Locate the container marked "CB-4164-41" or "Disk-Based Diagnostics," open it, and remove the end user license agreement. Read, sign, and date the form; then mail it.

( ) Locate disk 1 of the two-disk set. Read the instructions on the back of the protective envelope containing the diskette. Then unlatch disk drive 0, located on the unmarked (right-hand) disk drive chassis (if this has not already been done), and insert the disk into the drive so the label and write-protect notch are in the locations shown in Pictorial 2-2. Latch the drive by turning the latching lever down (clockwise).

( ) If the test menu is not already on the screen, press the ESC key until you obtain it.

( ) Press the 1 key to start the disk read test. The drive should access and the drive's LED should light. A counter should appear in the center of the screen as before. Allow the count to reach 50 or greater before you press ESC to end the test. Then press ESC again to return to the test menu.

( ) Press the 6 key. You should obtain the prompt shown below:

```
->
```

( ) Press the B key and then the ENTER/RETURN key to "boot" the Disk-Based Diagnostics disk. The screen should display a release and version number for a short time, followed by a Restricted Rights Legend.

NOTES:

1. If you obtain an I/O or disk error at this time, it is likely that your disk has become damaged so that it can not be booted. You can make this assumption since the above tests proved that the Computer itself can read a disk.

2. The diagnostic program is configured to test only one drive of each type. To test two Winchester and/or two floppy drives during the routine, see the "Configuration" section of the appropriate drive test chapter in the Disk-Based Diagnostics Manual.

( ) The term "Z386-40" should be printed in reverse video on the screen. If it is not, press the right "arrow" key until "Z386-40" is in reverse video.

( ) Press the ENTER/RETURN key. The screen will now give you a choice of a fast or slow test. Note that "yes" is displayed in reverse video on the screen. Since you wish to perform the fast test at this time, press the ENTER/RETURN key again.

The screen will now show you which test is being performed and the result (status) of the test (Passed or Failed). The length of time the entire test takes depends on the amount of memory you have installed in your Computer. The Winchester-AT Diagnostics should fail because there is no Winchester drive installed yet. If any of the other tests do not pass, refer to the Service Guide supplied with the disk-based diagnostics for instructions for performing more comprehensive tests.

( ) When the screen displays "All tests complete," press the END key to return to the Restricted Rights Legend.

( ) Turn the latching lever to unlatch the drive; then remove and return the disk to its protective envelope.

IMPORTANT NOTE: Your software distribution disks are supplied as low capacity 360K formatted disks. Your 1.2M high capacity floppy drive will read these disks. However, the 1.2M drive cannot reliably be used to write to 360K disks. If you attempt to write to a 360K disk using a 1.2M drive, you may not be able to read it properly later. You need to copy your distribution software onto a 1.2M formatted disk.

The proper procedure is to refer to your Owner's Manual and:

- Format a bootable 1.2M disk.
- Copy the data from your supplied 360K software distribution disks onto the 1.2M disk.
- Place all your supplied 360K software distribution disks away for safe keeping.
- Create and use a 1.2M working disk.

Now you will be able to write reliably to your 1.2M disks with the 1.2M drive.

( ) If you have no Winchester drives to finish installing, turn off your Computer and proceed to "Test Summary." If you do have a Winchester drive(s) to finish installing, continue with the "Winchester Drive Tests."

NOTE: If you ever remove the battery from the backplane connector at any time, this will disconnect the power from the CMOS memory and destroy the contents of the set-up table in memory, making it necessary for you to reconfigure the set-up table.

WINCHESTER DRIVE TESTS

( ) Turn your Computer off if this has not already been done.

NOTE: In the next three steps, you will connect drive cables coming from the Winchester drives to the controller circuit board. Perform only the steps which pertain to your particular Computer.

Refer to Pictorial 1-10 and connect the cables coming from the Winchester drive(s) to the disk controller circuit board as follows:

( ) 1. 34-conductor cable coming from the Winchester drive(s) to J2. Position the marked edge of the cable toward the top of the circuit board.

( ) 2. 20-conductor cable coming from the Winchester drive mounted on the marked disk drive chassis to J3. Position the marked edge of the cable toward the top of the circuit board.

( ) 3. 20-conductor cable coming from the Winchester drive mounted on the unmarked disk drive chassis to J4, if installed. Position the marked edge of the cable toward the top of the circuit board.

( ) Locate your disk operating system (MS-DOS) documentation and read the section(s) on Winchester drives at this time. (Be sure you have signed and returned any licensing agreement before you use the software.) Then proceed with the following steps.

( ) Turn your Computer on.

( ) If you have set up your Computer to autoboot, simultaneously press the CTRL, ALT, and INS keys to get a monitor prompt. Update the SETUP MENU again to exactly reflect the Winchester drive(s) that you installed. This will ensure that your Computer will "recognize" the additional drive(s) and provide the proper support. (NOTE: If you add additional Winchester drive(s) to your Computer later, the Computer will attempt to communicate with the drive or drives.) Since no Winchester drive is yet prepared, a "Drive Not Ready" error will be displayed after several minutes. Then press the ESC key.

( ) Insert the 1.2M working disk (MS-DOS, version 3.X) into floppy drive 0 (A) and boot the disk. To do this, press "B" and ENTER/RETURN when the monitor prompt –> appears.

( ) Follow the instructions in the DOS documentation and perform the "PREP" (preparation) routine on your drive(s) by typing the word "PREP" and then pressing ENTER/RETURN.

You should be aware that, depending on the storage capacity of your drive(s), the "PREP" routine can take several hours to complete. This is because the entire media will be written to and read from several times to identify any questionable areas on it. During this routine, "bad sectors" are located and "mapped" so that the drive will avoid using them. It is normal for several bad sectors to be located, especially on a large-capacity drive.

NOTE: It is not possible for you to have written anything to your Winchester drive yet, so you may ignore the PREP utility warnings. Also, the PREP utility makes use of the drive type information of the setup table. Should the drive type of the setup table be incorrect, the PREP utility will not be able to prepare the media surface of the drive, test the media, and write the bad sector table to the drive.

( ) After the "PREP" routine is completed, remove the DOS disk and return it to its protective jacket.

( ) Reinstall and boot the disk 1 diagnostics disk. To do this, press the CTRL, ALT, and INS keys simultaneously to get the –> prompt. Then press "B" and the ENTER/RETURN key.

( ) When you are asked to select the test desired, press the right arrow key until "Z386-40" is in reverse video. Then press the ENTER/RETURN key. NOTE: This diagnostic test is preconfigured to test only one 1.2M floppy drive and only one Winchester drive. If your floppy drive 0 is a 1.2M drive and you have only one Winchester at the drive 0 location, this test is preconfigured and you may simply run the fast test. The fast test will fail if you have another hardware configuration. If this is the case, you will have to reconfigure the Disk-Based Diagnostics test to test exactly your hardware configuration. Refer to the configuration information of your Disk-Based Diagnostics Manual to do this. Because you have tested your kit once already as a floppy only computer, you can reconfigure and run only the Winchester diagnostic tests. When you have correctly reconfigured the tests of Disk-Based diagnostics, the menu will ask if you wish to save this configuration to disk. Do not write to the distribution disks of your Disk-Based Diagnostics.

( ) Respond to the "fast test" question with a "NO" by using the "arrow" keys followed by the RETURN/ENTER key.

( ) Move the reverse video cursor from "ALL AUTOMATIC TEST" to "SINGLE TEST" by using the arrow keys; then press the RETURN/ENTER key. The test menu will now show "CPU DIAGNOSTIC" highlighted in reverse video.

( ) Use the arrow keys to select "WINCHESTER DIAGNOSTIC" highlighted in reverse video; then press the ENTER/RETURN key. The "Winchester Diagnostic Section Menu" should appear on the screen and "ALL AUTOMATIC SECTION" should be highlighted in reverse video.

( ) Press the ENTER/RETURN key to start the automatic Winchester diagnostic tests. The screen will show the progress of these tests, which will take about four minutes for a single 20M drive.

( ) Press the END key to return to the previous menu. Unlatch the floppy drive, remove the disk, and return it to the protective jacket. Then return it to the Disk-Based Diagnostics Manual.

NOTE: You will have to eventually reboot your MS-DOS operating system disk and generate more working disks. We strongly recommend that you do this by following the Manual and, for a time, ignore the fact that you have a Winchester drive which you may want to install the MS-DOS operating system onto. This is because you will develop a set of working MS-DOS floppy disks which will become configured in the manner in which you will be using your specific CPU in your specific application. When you have configured all the utilities of your working operating system disks to suit the I/O ports and partitions, etc., you will want to use them. Then you can simply copy these disks to the DOS partition of your Winchester drive and you will not have to go through this process again. Your working set of disks will serve as a backup for this exact configuration at any time you should want it.

TEST SUMMARY

( ) Turn the Computer OFF, if this has not already been done.

IMPORTANT: You must wait at least 20 seconds after you turn the Computer off before you turn it back on. The power supply capacity is such that it takes 20 seconds for all voltages to drop low enough to ensure that a power-on reset will occur when power is reapplied.

Be sure to store the diagnostic disk in a dry place where it will not be exposed to temperature extremes or magnetic fields. NOTE: We recommend that you always remove any disk(s) from the drive(s) before you turn the Computer off or on. This eliminates any possibility of the disk becoming damaged during power-up or power-down functions.

Since all the major parts of your Computer were factory-assembled and tested, and carefully packed before shipment, you should not need the additional Disk-Based Diagnostics at this time. If you ever suspect that your Computer is not operating properly, rerun the fast tests first; then refer to the Diagnostics Manual, if necessary, for more information about isolating a problem or verification of the Computer. In some cases, the particular symptom may provide you with some clues to where the problem is. If you suspect that there is some sort of problem related to writing and/or reading data on a floppy disk, for example, you know you should test the floppy disk drive(s) and the floppy disk section of the disk controller circuit board more thoroughly than the fast (automatic) tests perform. Refer to the proper area of the Diagnostics Manual for more information about using those tests. Tests identified with an "A" are automatic tests, while tests identified with an "M" are manual tests (which are not part of the fast or automatic tests). You should then run the manual tests to learn more about your particular problem. No special drive head alignment disks are included because the head alignment should be done only by qualified personnel.

If you should ever see an error message on the screen, note the exact message carefully, as it usually contains clues to the actual problem. If you need assistance in resolving a particular problem, you should provide the exact information as to which test produced the error message and exactly what the error message said. You should also furnish the exact hardware configuration (which options you have, etc).

If you purchase optional drives or cards at a later date, repeat the "Diagnostic Tests" after installing each option. This will ensure that the Computer is operating properly with the new option. NOTE: You may need to reconfigure the Diagnostics with each additional hardware option you install.

This completes the "Diagnostic Tests." Proceed to "Final Assembly."

FINAL ASSEMBLY

Refer to Pictorial 3-1 for the following steps.

( ) Place a soft cloth on your work surface to prevent scratching the front panel.

NOTE: Unless you have four disk drives in your Computer, you will install at least one of the three drive cover panels supplied with your kit in the following steps. Therefore, only perform the numbered step(s) that apply to your particular situation. If applicable, be sure to install a lower drive cover panel(s) before you install an upper panel.

( ) 1. At the drive C location, place a drive cover panel over the two mounting studs on the front panel at this location. Then push it against the inside of the panel and secure it with two retainers, four #6 flat washers, and four #6 × 3/8″ self-tapping screws. Be sure to position the "foot" of the retainer toward the drive cover panel as shown in the inset drawing.

( ) 2. At the drive D location, place a drive cover panel over the two mounting studs on the front panel at the open drive location. Then push it against the inside of the front panel and secure it with two #6 flat washers, and two #6 × 3/8″ self-tapping screws along the bottom of the drive cover panel.

NOTE: Complete step #3 below if you installed a drive at the drive B location. Otherwise, skip this step.

( ) 3. At the drive D location, secure the drive cover panel with two retainers, two #6 flat washers, and two #6 × 3/8″ self-tapping screws along the top of the drive cover panel. NOTE: Skip step #4 below.

( ) 4. At the drive B location, place a drive cover panel over the two mounting studs at that location. Then push it against the inside of the panel and secure it with two retainers, two #6 flat washers, and two #6 × 3/8″ screws.

( ) Place the computer nameplate over the two mounting holes in the panel and press it into position.

( ) Position the cover over the front panel as shown. Then attach the cover to the panel at AA, AB, AC, AD, and AE with five #6 × 3/8″ self-tapping screws.

( ) Position the cover spring along the top edge of the cover as shown. Then mount the spring to the cover at AG with a #6 × 1/4″ sheet metal screw, and at AF with a #6 × 3/8″ self-tapping screw.

Refer to Pictorial 3-2 for the following steps.

( ) Be sure the POWER switch is in the OFF position and disconnect the line cord, monitor cable, and keyboard cable, if this has not already been done.

( ) Refer to Detail 3-2A and use a 6-32 × 1/4″ screw to mount a small cover plate onto the rear of the chassis at each unused circuit board position. Be sure the tab on the bottom of each plate enters its respective slot near the bottom of the chassis.

( ) Be sure to position all cables in the Computer so they extend no higher than the top of the chassis.

( ) Check the lock to be sure it is in its fully clockwise position (locking arm is retracted).

NOTE: In the next step, you will install the cover. You may have to force the cover toward the rear panel to start the mounting screws, due to the cover spring mounted inside the cover.

( ) Slide the cover over the front of the Computer toward the rear, making sure the tab on the rear panel enters the cover slot for it. Then loosely mount the cover with six 6-32 × 5/16″ screws. When you have all the screws started, tighten the two rear panel screws; then tighten the four screws on the sides.

This completes the "Final Assembly" of your Computer. NOTE: Depending on the options installed in your Computer, you may have several parts left over.

A "Service Guide" has been provided to assist you in isolating any possible problems. This guide is primarily intended for service personnel who have spare circuit boards for substitution in locating a problem area. It will help you narrow down any problem to one specific circuit board or assembly, thus allowing you to return a circuit board rather than the entire computer should a problem develop. Refer to the "Customer Service" information printed on the inside back cover of this Manual for packing and shipping instructions, should this become necessary.

Your Computer needs at least 20 seconds after being turned off before you turn it on again. This is due to the capacity of the power supply. It takes at least 20 seconds for the supply voltages to drop low enough to ensure that a system reset occurs when power is reapplied.

NOTE: A "Warning" statement on the rear panel of your Computer indicates that a fuse is located inside the unit. The fuse referred to is located inside the power supply assembly and is not accessible from the outside of the assembly. Should this fuse ever fail, it indicates a catastrophic failure has occurred in the power supply circuitry, and the assembly must be serviced at the factory or a Heath/Zenith Computers and Electronics Center. Do not attempt to repair the power supply assembly.

SPECIAL SHIPPING INSTRUCTIONS

If it ever becomes necessary to ship your entire Computer to the factory for repair, back up the data on any Winchester drives installed (if possible) and then perform the "SHIP" routine on the drive(s). Remove the disk drive(s), Winchester drive(s), and circuit boards from inside the Computer. Pack the assembled circuit boards in the special conductive bags and small carton they were shipped in. Overpack the boards in a second carton with three inches of resilient material around the inside of the box to further protect the boards. Pack the disk drives in their shipping boxes with the cardboard inserts inside each drive for protection. Pack any Winchester drives in their respective shipping cartons. If only a board or drive is at fault, return only the board or drive that fails the diagnostic tests. Do not return the entire Computer. Refer to "Customer Service" on the inside back cover of this Manual.

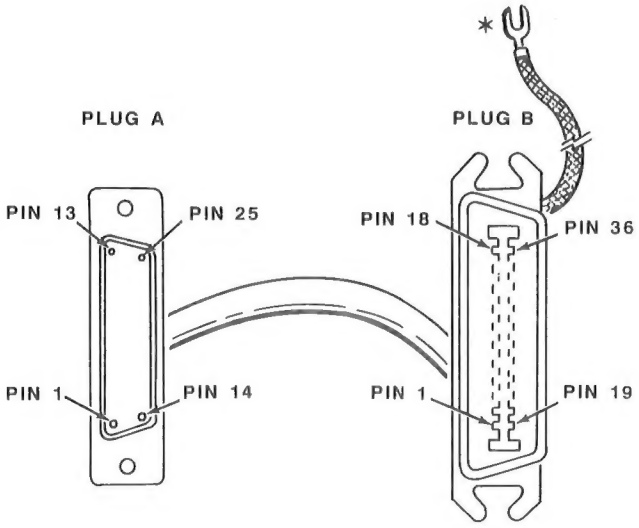
Whenever you return your Computer (or any part of it) for service, be sure to include an exact description of your system configuration and jumper settings, along with a detailed description of any error messages and the symptom(s) your Computer is exhibiting. This information will help the service technician locate and correct your specific problem in a minimum amount of time. Also be sure the lock is in the UNLOCKED (clockwise) position.

PRINTER CABLE

Use the printer cable (Heath Part No. 134-1653 – supplied with your kit) between the parallel port connector on the rear panel of your Computer and the parallel port connector of your printer, provided it is a Centronics-type port. The pins of plug A of this cable connect to the pins of plug B as shown below.

PLUG A	TO	PLUG B
1	STROBE	1
2	DATA 1	2
3	DATA 2	3
4	DATA 3	4
5	DATA 4	5
6	DATA 5	6
7	DATA 6	7
8	DATA 7	8
9	DATA 8	9
10	$\overline{\text{ACKNLG}}$	10
11	BUSY	11
12	PE	19
13	SLCT	13
14	$\overline{\text{AUTO FD XT}}$	14
15	$\overline{\text{ERROR}}$	32
16	$\overline{\text{INIT}}$	31
17	$\overline{\text{SLCT IN}}$	36
19	GND	16
23	GND	23
24	GND	24
CASE	SHIELD	N/C

*This lead should be connected to a ground location.



*This lead should be connected to a ground location.